In the Drawings

Please replace the figures with the corresponding figures set forth on the Replacement Sheets of drawings attached as an appendix hereto.

Remarks/Arguments

The specification has been amended to correct a minor typographical error regarding a reference numeral, and the drawings have been amended to include textual labels. Likewise, the claims have been amended to more clearly reflect the invention. Even in light of these amendments, no new matter has been added. It would be appreciated if the Examiner would indicate the acceptance of this amendment in the next office communication.

Drawings

The Examiner has objected to the drawings because the drawings lack textual labels for block diagram components. Accordingly, Figures 1, 2, and 4 have been amended to include textual labels, and thus, withdrawal of this objection is respectfully requested.

Claim Rejections - 35 USC § 112

The Examiner has rejected claims 1, 2, and 3 and under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the invention.

Specifically, the Examiner indicated that these claims recite improper transitional phrases. Accordingly, these claims have been amended to include proper open-form transitional phrases, and withdrawal of this objection is respectfully submitted.

Claim Rejections - 35 USC § 102

The Examiner has rejected claims 1-10 under 35 U.S.C. § 102(b) as being anticipated by Kiraly (US 5,467,242). However, Kiraly does not teach every element of amended claim 1. Namely, the Kiraly reference does not disclose a piloting process having a succession of different commutation voltages that requires a condition of passage to be satisfied before *each* commutation voltage can proceed to a successive commutation voltage. Since Kiraly does not disclose every limitation of at least amended claim 1, withdrawal of the rejection for anticipation is respectfully submitted.

The present invention is directed to a piloting process for controlling an electronic power component, such as a power transistor. The piloting process includes a plurality of steps for controlling a successive application of different commutation voltages to the electronic power component. As set forth in the specification of the present application, an igniter 4 includes a unit 20 for piloting a transistor 10. To pilot the transistor

10, the unit 20 applies a succession of different commutation voltages V_{GE}, namely V_{15}, V_{10}, V_0, and V_{-10}, to a gate of the transistor 10. The voltage V_{15} corresponds to a voltage for maintaining the transistor 10 in a conducting state, and the voltage V_{10} represents a voltage for braking commutation of the transistor 10. Further, the voltage V_0 corresponds to a voltage for blocking the transistor 10, and the voltage V_{-10} represents a voltage for maintaining the transistor in a non-conducting state. Thus, the present invention requires four different commutation voltages to create four commutation states, namely a conducting state, a braking state, a blocking state, and a non-conducing state.

More specifically, the present invention is directed to a piloting process for controlling an electronic power component that requires a condition of passage to be satisfied before *each* commutation voltage can proceed to a successive commutation voltage. For example, according to the specification of the present application, a piloting process 50 begins with a step 52 in which a logic processing unit 24 controls a piloting unit 20 to apply a blocking voltage V_0 on a gate of a transistor 10. During the step 52, the commutation voltage V_{GE} is zero and the current-emitter voltage V_{CE} of the transistor 10 begins to increase.

Step 52 automatically stops when either of the conditions of passage 58 or 60 are satisfied. The condition of passage 58 is satisfied when a comparator 32 indicates to the logical processing unit 24 that the voltage V_{CE} is higher that a threshold S2. The condition of passage 60 is satisfied when a timer 42 indicates that a predetermined time period $T_{MAX\ OPENING}$ has elaspsed. If the condition of passage 58 is satisfied before the condition of passage 60, then the logically processing unit 24 automatically proceeds to a next step 64 and applies a braking voltage V_{10}. On the other hand, if the condition of passage 60 is satisfied before the condition of passage 58, then the piloting process 50 is interrupted and a safeguard 66 is activated. Thus, the present invention teaches a piloting process that requires a passage condition be satisfied before *each* commutation voltage can proceed to a successive commutation voltage.

In contrast, the Kiraly patent discloses a protection device for providing a power transistor with *short circuit current protection*. As set forth in the Kiraly reference, a driver 60 provides gate pulses to an insulated gate bipolar transistor (IGBT) 50 so that the IGBT commutates between a conducting state and a non-conducting state. Assuming arguendo that the gate pulses disclosed in the Kiraly reference involve different

voltages, Kiraly only discloses two different commutation voltages, namely a voltage corresponding to a conducting state and a voltage corresponding to a non-conducting state.

During the conducting state, if an *overcurrent* occurs, for example, due to a short circuit, then a collector-emitter voltage of the IGBT 50 increases above a reference voltage Vref, which subsequently causes an output of a comparator 10 to go high and initiate a timer 30. If the overcurrent disappears before the end of a predetermined time period of the timer 30, then the output of the comparator 10 goes low and normal operation of the IGBT 50 proceeds. On the other hand, if the overcurrent is still present at the end of the time period of the timer 30, then commutation of the IGBT 50 is stopped. Thus, Kiraly teaches a protection device for protecting a power transistor from short circuits only when the power transistor is in a conducting state. Since the Kiraly patent does not teach a piloting process that requires a passage condition to be satisfied before *each* commutation voltage can proceed to a successive commutation voltage, withdrawal of this rejection is respectfully requested.

Claim Rejections - 35 USC § 103

The Examiner has rejected claims 11-14 under 35 U.S.C. § 103(a) as being unpatentable over Kiraly (US 5,467,242) in view

of Shekhawat et al. (US 6,275,093). However, the Examiner has not met the burden of establishing a prima facie case of obviousness because the combined teachings of the Kiraly and Shekhawat references do not teach or suggest every claim limitation of amended claim 1 and claims 11-14 which depend therefrom. Thus, as discussed in detail below, withdrawal of this rejection is respectfully requested.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference or combination of prior art references, must teach or suggest all the claim limitations.

In this case, the combined teachings of the Kiraly and Shekhawat references do not teach or suggest every claim limitation, namely a piloting process that requires a passage condition to be satisfied before *each* commutation voltage can proceed to a successive commutation voltage. As set forth above, Kiraly is directed to a short circuit protection device and thus does not disclose the piloting process set forth in at least amended claim 1. The protection scheme disclosed in the

Shekhawat patent also lacks a teaching of a piloting process that requires a passage condition to be satisfied before each commutation voltage can proceed to a successive commutation voltage. As the Examiner pointed out, Shekhawat discloses a gate drive for an insulated gate bipolar transistor (IGBT) having a short circuit protection. Specifically, Shekhawat teaches a protection that turns off an IGBT in two steps when there is a short circuit.

As set forth in the specification of the Shekhawat patent, when a short circuit exists, a collector-to-emitter voltage V_{CE} of an IGBT begins to increase. When V_{CE} increases to a certain voltage, a turn-on gate voltage supplied to the IGBT is lowered to some level above a threshold voltage V_T of the IGBT. Once the turn-on gate voltage is lowered, the IGBT can be turned off safely, even in the presence of a short circuit condition. While the Shekhawat reference discloses a protection system that controls the application of *one commutation* voltage, namely a turn-on voltage, the Shekhawat protection system does not control the application of *each* of the commutation voltages, including the turn-on voltage and the turn-off voltage.

Since neither the Kiraly patent, nor the Shekhawat patent, teach a piloting process that requires a passage condition to be

satisfied before *each* commutation voltage can proceed to a successive commutation voltage, the combined teachings of these references do not disclose every limitation of at least amended claim 1. Thus, withdrawal of this rejection is respectfully submitted.

The Examiner has also rejected claims 15-18 under 35 U.S.C. § 103(a) as being unpatentable over Kiraly (US 5,467,242) and Kesler et al. (US 6,194,884). However, the Examiner has not met the burden of establishing a prima facie case of obviousness because the combined teachings of the Kiraly and Kesler references do not teach or suggest every claim limitation of amended claim 15 and claims 16-18 which depend therefrom. Thus, as discussed in detail below, withdrawal of this rejection is respectfully requested.

In this case, the combined teachings of the Kiraly and Kesler references do not teach or suggest every claim limitation, namely a piloting process that requires a passage condition to be satisfied before *each* commutation voltage can proceed to a successive commutation voltage. As set forth above, Kiraly does not teach the piloting process required by at least amended claim 1. Kesler also lacks a teaching of a piloting process that requires a passage condition to be satisfied before each commutation voltage can proceed to a successive commutation

voltage. Thus, the combined teachings of the Kiraly and Kesler references do not disclose every limitation of amended claim 15, and withdrawal of this rejection is respectfully submitted.

Kesler does not disclose a piloting process that requires a passage condition to be satisfied before each commutation voltage can proceed to a successive commutation voltage, as required by at least amended claim 15. As the Examiner pointed out, the Kesler patent is directed to a gate driver for a transistor with an external input EST that may be received from a computer. Kesler is silent with regard to any system for controlling a succession of commutating voltages supplied to a transistor. Since Kesler does not teach a piloting process that requires a passage condition to be satisfied before *each* commutation voltage can proceed to a successive commutation voltage, the combined teachings of the Kiraly and Kesler references do not disclose every element of amended claim 15 and those claims depending therefrom. Accordingly, withdrawal of the rejection of these claims is respectfully requested.

In view of the foregoing, reconsideration of objections and rejections is respectfully requested and favorable consideration and allowance of the claims solicited. Should the Examiner have any questions regarding this response, the amendments submitted herewith, or the allowability of the claims, it would be

appreciated if the Examiner would contact the undersigned attorney of record at the telephone number provided below for purposes of facilitating prosecution of this application and for scheduling an interview, if necessary.

Respectfully submitted,

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By 
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